



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/606,512	06/26/2003	Jung-Wook Kim	8054-23 (AW8037US/JJ)	5217
22150	7590	09/27/2006	EXAMINER	
F. CHAU & ASSOCIATES, LLC			KORNAKOV, MICHAEL	
130 WOODBURY ROAD			ART UNIT	
WOODBURY, NY 11797			PAPER NUMBER	

1746

DATE MAILED: 09/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/606,512

Applicant(s)

KIM

Examiner

Michael Kornakov

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicants' amendment dated 07/24/2006 is acknowledged. Claims 1, 15 are amended to recite "treating the processing chamber to be substantially free of hydrogen". Claim 7 is amended reciting "to prevent hydrogen radicals or chemical compounds having hydrogen from forming or remaining in the processing chamber".
2. Claims 1-19 are pending and examined on the merits.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1, 7, 15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The newly amended claims 1 and 15 recite "treating the processing chamber to be **substantially free** of hydrogen" and the newly amended claim 7 recite "to prevent hydrogen radicals or chemical compounds having hydrogen from forming...in the processing chamber" while etching the chamber". These limitations have not been presented in the original specification.

Examiner's comment

5. Applicants recite "a non-hydrogenous second gas". This limitation has been interpreted as a gas mixture, which does not include hydrogen gas in light of Applicants' disclosure stating that "the processing chamber is etched with a plasma of a non-hydrogenous second gas. In other words, the non-hydrogenous second gas does not include a hydrogen gas" (paragraph bridging col.7 and 8) and that "a second gas without the hydrogen gas (namely non-hydrogenous) is supplied to the processing chamber"(page 18, lines 9-11).

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 2, 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recited in claim 2 "...an inside of the processing chamber includes silicon oxide" and the recited in claim 9 "...at least one of the stage and the belljar includes silicon oxide" constitutes an indefinite subject matter because it is not clear whether an impurity of silicon oxide to be removed or a protective coating including silicon oxide is indicated. Clarification is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1746

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-4, 7-9, 11, 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayasaka et al (U.S. 6,649,082) in view of Roberts et al (U.S. 5,626,775).

Hayasaka teaches a method for manufacturing a semiconductor device comprising treating semiconductor substrate by forming and etching films, including SiO₂ film, with a plasma of gas including hydrogen and argon (col.5, lines 47-55).

Art Unit: 1746

Hayasaka also teaches that the apparatus for forming semiconductor device is cleaned in order to remove unnecessary deposit accumulated on the inner wall of the apparatus, jig and the like, because unnecessary deposit causes generation of particles and must be removed on occasions so as to form a good film (col.13, lines 2-7). Hayasaka remains silent about specificities of cleaning the inside surfaces of the apparatus. However, it is noted here that the steps of exhausting a gas from the processing chamber during substrate processing and removing the processed substrate from the chamber upon processing are conventionally utilized in the art.

Roberts teaches cleaning the walls and other surfaces within the CVD reaction chamber having silicon dioxide deposits thereon. The method of Roberts comprises creating plasma etch conditions within the chamber utilizing trifluoroacetic anhydride and a carrier gas, such as argon. Roberts specifically indicates the benefits of using trifluoroacetic anhydride as the compound containing no hydrogen, which can act to stabilize free radicals initiated by the plasma, and having no significant contribution to Global Warming (Abstract; paragraph, bridging col.2 and 3; col. 4, lines 55-65).

Therefore, since Hayasaka is concerned with cleaning the semiconductor processing apparatus, wherein silicon oxide films have been plasma processed and Roberts teaches cleaning a CVD plasma processing chamber by removing silicon oxide deposits and indicates benefits of utilizing hydrogen free reactive compounds for such cleaning, one skilled in the art motivated by Roberts would have found obvious to exhaust the apparatus of Hayasaka, remove the semiconductor device from the apparatus of Hayasaka, as conventionally accepted in the art, and employ the chamber

Art Unit: 1746

cleaning method of Roberts by creating a vacuum in the chamber of Hayasaka, introducing trifluoroacetic anhydride and argon and ignite the plasma in order to clean the semiconductor processing apparatus of Hayasaka and prevent hydrogen radicals from forming in the processing apparatus of Hayasaka, thus arriving at the claimed subject matter.

With regard to claims 8, which is concerned with disposing a belljar, it is noted here that the claimed invention calls for the process claims, wherein the steps of the process are met by the applied prior art, and the structural limitations of apparatus do not present manipulative difference between the claimed process steps and the prior art process. Therefore, the recitation of specific structural limitations of apparatus for performing such steps does not serve to limit the claim. See, e.g., *In re Otto*, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963)

With regard to claims 2 and 9, which are concerned with presence of silicon oxide inside the chamber and on certain structural elements, Hayasaka indicates that residues may accumulate on inside surfaces of the processing apparatus during semiconductor device processing. Since Hayasaka indicates treatment SiO_2 containing device, the residues of SiO_2 are expected to accumulate on the inside surfaces of processing apparatus.

With regard to the limitations of claims 13 and 14, which are specifically concerned with exhausting the second gas or the first gas, Hayasaka teaches importance of such exhausting and collecting the harmful gases formed during the

Art Unit: 1746

semiconductor and/or chamber treatment procedures and Roberts teaches cleaning under reduced pressure, thus continuously exhausting gases from the chamber.

7. Claims 5, 6, 10, 12, 18, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayasaka et al (U.S. 6,649,082) in view of Roberts et al (U.S. 5,626,775) and in further view of Zhao et al (U.S. 5,660,682).

The teaching of Hayasaka/Roberts does not specifically indicate a flow ratio between argon and hydrogen and a temperature for removing impurities, particularly silicon oxide, from the semiconductor device. However, such parameters are result effective, because they affect the rate of processing and surface condition of the substrate. Providing optimum processing parameters is within the skills of ordinary skilled in the art and would be obvious, consult In re Boesch and Slaney 205 USPQ 215 (CCPA 1980).

Besides, the recited processing parameters are conventionally utilized in the art, as specified, for example by Zhao (col.3, lines 32-50), who teaching the use of hydrogen/argon plasma for the removing of silicon oxide from wafer/IC surfaces. Therefore, one skilled in the art would have found obvious to utilize processing parameters of Zhao while treating semiconductor device as per teaching of Hayasaka/Roberts with the reasonable expectation of success.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

Art Unit: 1746

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

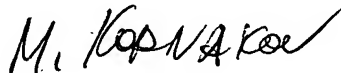
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1404. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1746

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Michael Kornakov
Primary Examiner
Art Unit 1746

09/22/2006